TECHNICAL AND SCIENTIFIC SERVICES IN PHOTOGRAPHICS, PHOTO-OPTICS AND DATA PROCESSING

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JUNE 13, 1966

The data set forth herein is submitted as an unsolicited proposal and shall not be disclosed outside the Government or be duplicated, used or disclosed in whole or in part for any purpose other than to evaluate the proposal; provided, that if a contract is awarded to this offeror as a result of or in connection with the submission of such data, the Government shall have the right to duplicate, use, or disclose this data to the extent provided in the contract. This restriction does not limit the Government's right to use information contained in such data if it is obtained from another source.

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UNSOLICITED

TECHNICAL PROPOSAL

TECHNICAL AND SCIENTIFIC SERVICES

IN

PHOTOGRAPHICS, PHOTO-OPTICS AND DATA PROCESSING

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TECHNICAL PROGRAM

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TECHNICAL PROGRAM

This unsolicited technical proposal presents a program designed to supply, on a time and materials basis over a period of one year, certain technical and scientific services of a staff augmentation nature. The services proposed will lie within the general area of reconnaissance - intelligence technology and will include but not be limited to the following disciplinary areas:

1. Data processing and handling.
2. Analytical and computational methods.
3. Photographic processing.
4. Photographic, optical and mensuration standards and techniques.
5. Image quality assessment.
6. Color technology.

The purpose of the proposed program will be to supply technical services at various levels as back-up to the customer's staff. Work undertaken may be independent investigation of problems of customer interest or may be formulated as a continuation of lines of study initiated by the customer.

The work to be pursued under this program will be carried out under mutually agreeable work plans. In addition to experimentation and analysis performed at the Data Corporation facility, consulting, advisory and/or other services will be supplied to the customer at his facility and upon his request. It is proposed that certain lines of investigation be established within thirty (30) days after contract, such investigative lines being based upon current problems of customer interest. Such fields of investigation might include:

1. Small scale phenomena in the photographic image formation area.

2. Analytical and computational methods in the treatment of image formation.

3. Color reproduction materials and processes.

4. Microdensitometric studies.

The work proposed will be performed under the direct supervision [redacted] STAT
[redacted] STAT
[redacted] Other staff members will assist as required. STAT

A total of 1,400 hours are proposed with engineering and scientific services to be supplied in the following categories:

Executive Engineer

Staff Engineer/Scientist

Senior Engineer/Scientist

Engineer/Physicist

Mathematician

Technician

SECTION 2

BACKGROUND AND EXPERIENCE

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BACKGROUND AND EXPERIENCE

[redacted] has for ten (10) years specialized in research and development in the reconnaissance-intelligence field. The company is well equipped from both facility and personnel standpoints to conduct experimental and theoretical investigation in all related fields. The Company does not engage in manufacturing. STAT

The material contained in the following pages is descriptive of Company experience, staff and facility.

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COLOR ANALYSIS

Under contract to the Minnesota Mining and Manufacturing Company, [redacted] STAT designed and fabricated an automatic color analyzer to be used with the Electro-color process. This device is capable of area averaging operation or spot sampling and is equipped with the necessary over-ride and balance controls. In operation, the device eliminates completely the requirement for manual balance and trial prints, thereby improving production rate and lowering cost appreciably. The system incorporates such advanced features as automatic reciprocity and latent image failure compensation. The interface is designed such that all controls on the basic machine are automatically set with no manual intervention required.

RESOLUTION MEASUREMENT

Under the terms [redacted] STAT
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[redacted] the company has been deeply involved in programs designed to improve techniques and instrumentation to make more reliable resolution measurements. These programs have involved fabrication of new high resolution master targets, development of a highly accurate recording microdensitometer, development of master standards for calibration of resolution measurement systems, application of edge gradient measurement systems, and development of techniques for evaluating total subsystem performance through use of microdensitometer techniques. Under the terms [redacted] STAT the company has designed and built digitizers for converting the analog output of the Micro-Analyzer into a digital output on punched paper tape. This allows data from the Micro-Analyzer to be fed directly into a digital computer for further analysis.

MICRODENSITOMETRIC STANDARDS

Under contract to the Air Force, [redacted] has designed, fabricated, and calibrated a new set of standards for use in microdensitometer calibration. Included as part of this project was a new machine-readable resolution target. The configuration of this target was presented to the ABC committee during their past meeting for consideration as a new national standard. Density standards and calibration techniques for microdensitometers have been developed including bar targets, mensurating standards, micro-macro step wedges and other test objects. These standards are presently being developed for the Air Force in cooperation with the National Bureau of Standards. STAT

As new systems and photographic emulsions are being developed today, it is necessary to upgrade the methods used for their analysis. [redacted] has in house a project to extend the resolution standards to include these advances. Research is continuously being carried on to determine optimum target configurations. STAT

OPTIMIZED TONE REPRODUCTION

For the past several years, [redacted] personnel have been engaged in photographic tone reproduction studies under various Air Force contracts. These projects have ranged from the design of computer programs to implement pre-established criteria through the analysis of non-conventional materials from a tonal standpoint. Investigations have also been conducted with respect to the optimization of tone reproduction on the basis of information transfer. Current work is directed toward the application of dynamic programming to this latter problem.

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IMAGE FORMATION RESEARCH

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[redacted], under Air Force Contract, has performed research in image formation in optical systems. This work has led to interesting anomalies in testing procedure and to clearer definition of film-optics interaction. The investigation has been performed in conjunction with Air Force laboratories. In-house work has been conducted on the Mann Model 1200 optical bench with microtome sectioning frequently used to assess development penetration. Under this program the effects of sensitometric testing were also analyzed, particularly with respect to the use of projection sensitometry.

MICRO-PROFILE MEASUREMENT TECHNIQUES

Under contract to [redacted] developed a technique for STAT the measurement of surface profiles in the micro-inch range. This technique involved a sophisticated application of microscope optics in an unconventional manner to yield sensitivity well outside the expected performance of the optical system.

PHOTOGRAPHIC SYSTEM EVALUATION

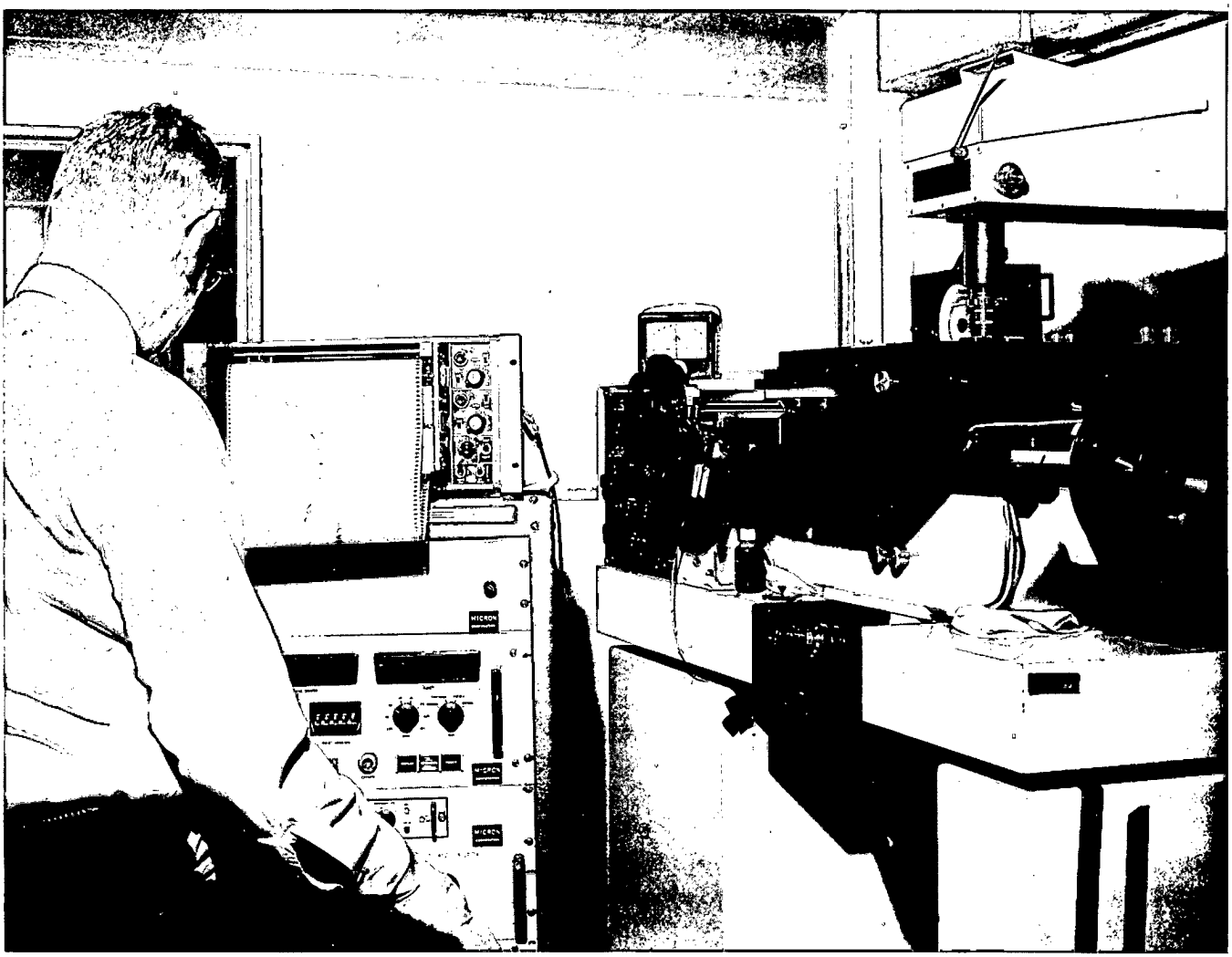
The CORN Program is a project designed to provide data contributing to a more meaningful analysis of photographic system performance based on optical resolution displays. The program is carried out under the direction of the Photographic Branch, Directorate of Reconnaissance Engineering, W-PAFB, Ohio.

Included in the network are a series of permanent optical resolution displays which are maintained in a useful state and instrumented to provide necessary ground truth data. These target displays are linked by a central communication network and support can be obtained at any display area within the network by submitting a requirement to a Requirements Central Agency.

With the establishment of the controlled range network a need was demonstrated for inexpensive, easily operable, low maintenance mobile target displays that could be used under optimum conditions. As a means of satisfying that need, several mobile target units were established and based at various locations, thus permitting rapid deployment of target arrays at any requested geographic location within the Continental United States. These target arrays consist of the following type photographic analysis targets; Mil. Std. and "T" Bar resolution targets, gray scale targets, edge analysis targets, sine wave targets, and point source targets. Related ground instrumentation is also provided.

Target arrays are available which are designed for microdensitometric evaluation and the development of modulation transfer functions for more sophisticated quantitative analyses of system performance. [redacted] maintains a staff of qualified image interpreters for image analysis and systems evaluation. STAT

During this program, [redacted] has been responsible for research and development in the targeting area. This activity has included origination of new targets, new operating concepts, unique manufacturing methods and materials investigation. The targeting program has been operated as a dynamic system with new ideas injected as they are proven. STAT

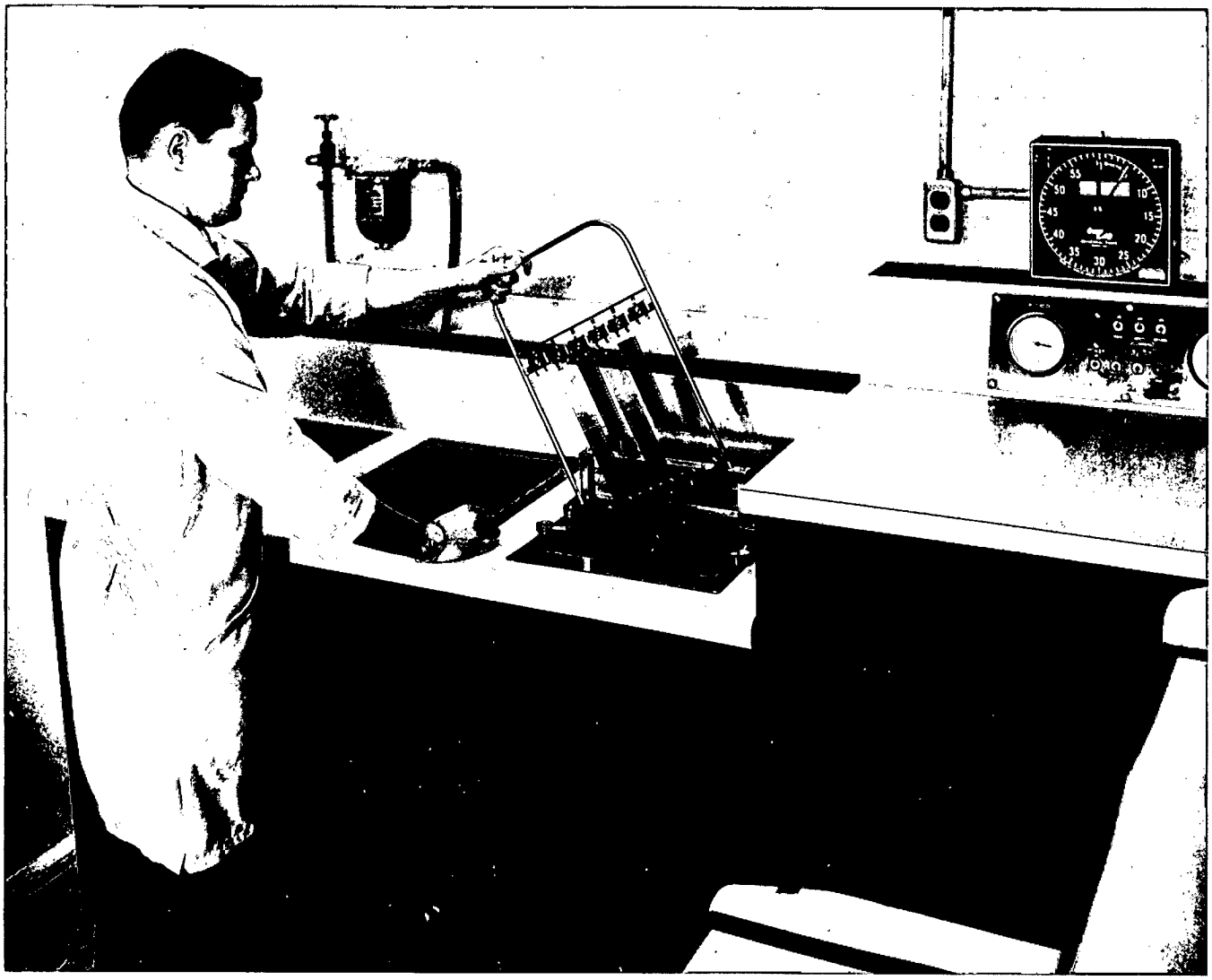


MICRO ANALYZERS

Two analyzers are located in absolute vertical flow clean room areas. The analyzers are programmable for random scanning. Output in either density or transmittance is digitized or transmitted directly into a computer. Scan speeds can be varied from 25 microns/minute to 25 millimeters per minute. Areas as small as one micron in diameter can be analyzed with densities above 3. Slits and other aperture shapes are also interchangeable. Roll or cut film may be analyzed. Frequency response of logarithmic amplifiers of over 3 KC permits scanning of extremely small areas at relatively high speed. Mensuration precision while scanning is better than .3 microns. Over 50 lens systems are available at [redacted] to permit a highly versatile analysis system with these analyzers. STAT

LEITZ MICROTOME

The microtome and its auxiliary equipments are used to cross section film samples for grain distribution study. Techniques have been developed which permits sectioning 1 micron slices of complete target arrays for study of grain development and distribution versus bar size. A Zeiss W L Laboratory microscope, with micro–photographic equipment, complements this equipment for complete specimen evaluation.



SENSITOMETRIC PROCESSOR

This processor was designed and built by [redacted] to maintain sensitometric control on all film tests. Paddle agitators are precisely controlled for stroke rate in chemical baths with temperatures controlled within ± .1° F. Stop baths and rinse tanks are included to permit complete processing in one unit.

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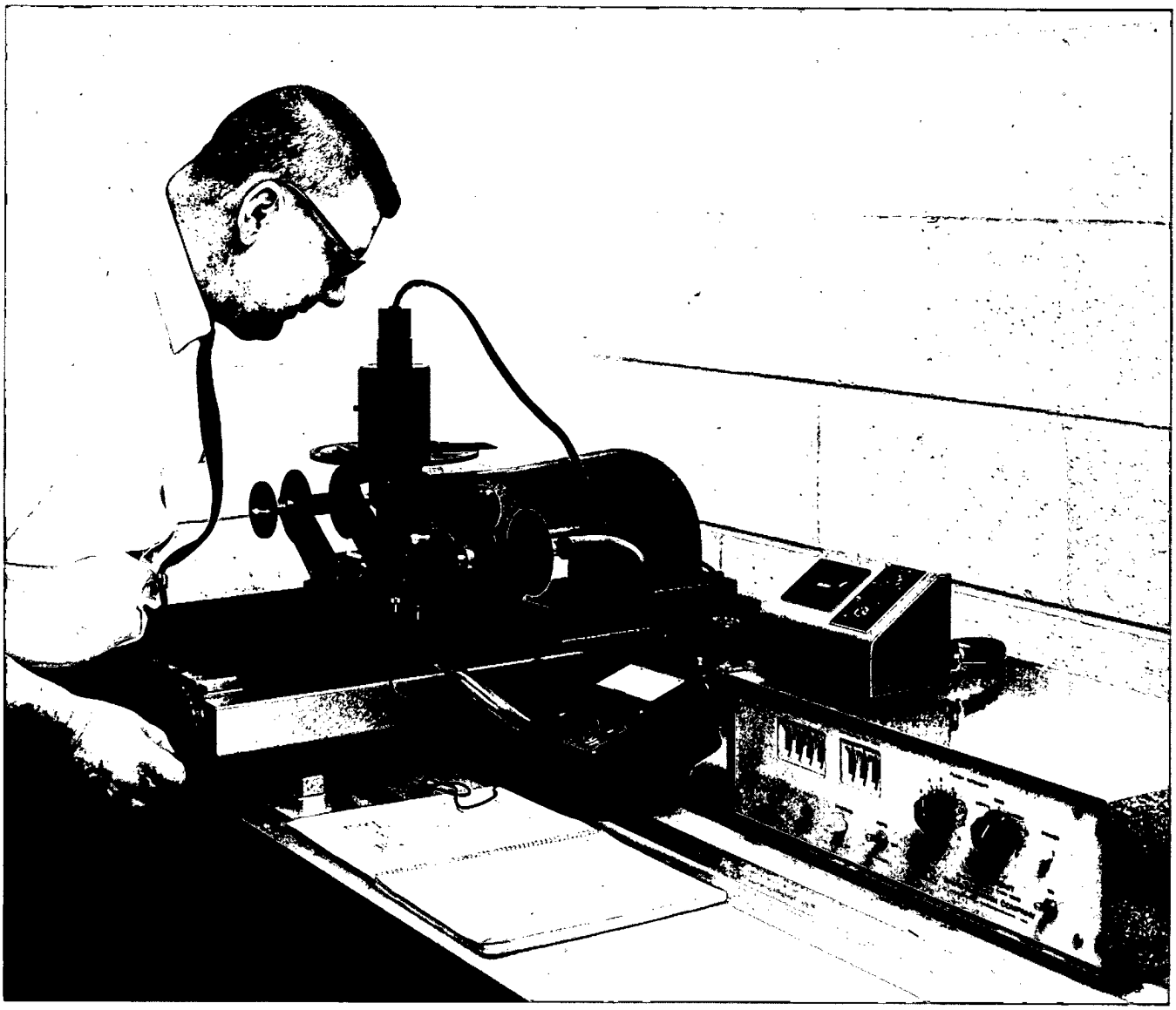

EDGE SENSITOMETERS

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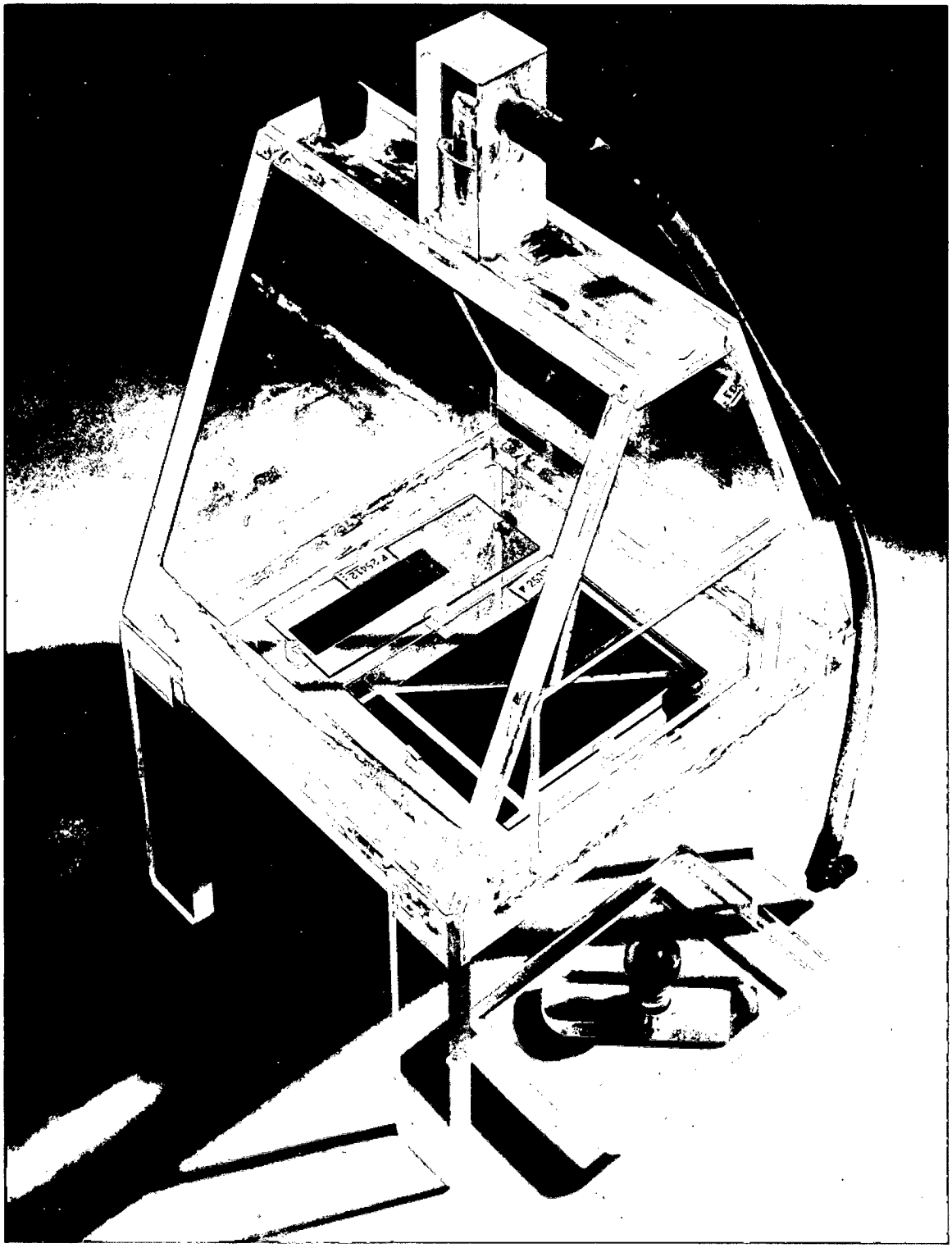
These machines designed for [redacted] are capable of generating targets, density steps or test objects on roll film. Semi-automatic operation permits laying down of a large number of targets for testing of printers, processors, etc. The same type optics are used as on the step and repeater printers. Vacuum hold down and a unique measurement device assures focus on each exposure. Space variations for exposure are predetermined and automatic.



GLASS PLATE PROCESSOR

This spray processor was built to automatically process glass plates for master calibration targets and special test objects – variable timing permits highly accurate control of each spray sequence.

SECTION 3

COST DATA

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